ZHDANOV, A. P., KARTUYANSKIY, A. L., KUZ'MIN, V. N., RYZHKOVA, I. V., FEDOTOV, P. I., and SHUR, L. I. (Moscow) USSR

"Preparation Des Emulsions Nucleaires et Mecanisme De Leur Sensibilisation Par La Triethanolamine."

Paper presented at Program of the Second International Colloquium on Corpuscular photography. Montreal, 21 Aug - 7 Sep 1958

Encl: B-3,114,647.

SHUR, L.I.

ZHDANOV, A.P.; KARTUZHANSKIY, A.L.; RYZHKOVA, I.V.; SHUR, L.I.

Effect of triethanolamine on photographic emulsions sensitive to particles of a minimal ionizing capacity. Zhur. nauch. i prikl. fot. i kin. 3 no.1:53-54 Ja-F '58. (MIRA 11:2)

1.Radiyevyy institut imeni V.G. Khlopina AN SSSR.
(Photographic emulsions)
(Ethanol)

ZHDANOV, A.P.; KARTUZHANSKIY, V.L.; SHUR, L.I.

Interpretation of experiments on increasing the sensitivity of nuclear photographic emulsions by means of triethanolamine. Zhur. nauch. i prikl. fot. i kin. 3 no.2:139-140 Mr-Ap '58. (MIRA 11:5)

1.Radiyevyy institut im. V.G. Khlopina AN SSSR.
(Photographic emulsions)

Sov 77-3-4-9/23

AUTHORS: Zhdanov, A.P.; Kartuzhanskiy, A.L.; Ryzhkova, I.V.; Shur, L.I.

TITLE: The Mechanism of the Sensitizing Action of Triethanolamine on Photographic Emulsions (O mekhanizme sensibiliziruyushchego deystviya trietanolamina na fotograficheskiye emul'sii)

PERIODICAL: Zhurnal nauchnoy i prikladnoy fotografii i kinematografii, 1958, Vol 3, Nr 4, pp 281-282 (USSR)

ABSTRACT: The author carried out experiments to determine the nature of the sensitizing effect of triethanolamine on photographic emulsions. He found that it was effective only up to the time of exposure and is therefore not connected with the development process. Triethanolamine has only a very insignificant, if any, function as an acceptor of haloid atoms during exposure. The experiments contradicted the assumption of the silver nature of the centers of sensitivity but bears out Mitchell and Mott's hypothesis as to their nature. The triethanolamine's alkalinity is essential to its action. In a reaction of AgHal with it or with an alkali, AgOH is formed but the further reaction - $AgOH \rightarrow Ag_2O \rightarrow Ag$ - takes place without their participation. The author finally concludes that the end result of the action of triethanolamine on the emulsion crystals is the formation of subcenters of development sited

Card 1/2

The Mechanism of the Sensitizing Action of Triethanolamine on Photographic Emulsions

primarily on the centers of sensitivity. There are 9 references, 6 of which are Soviet, 2 English and 1 American.

ASSOCIATION: Radiyevyy institut im. V.G. Khlopina Akademii nauk SSSR (The Radium Institute imeni V.G. Khlopin, Academy of Sciences, USSR)

SUBMITTED: March 1, 1958

1. Triethanolamine--Photochemical reactions 2. Photographic emulsions --Materials 3. Photographic emulsions--Sensitivity

AUTHORS: Zhdanov, A. P., Kartuzhanskiy, A. L., 20-118-4-33/61
Ryzhkova, I. V., Shur, L. I.

TITLE: The Action of Triethanolamine on Photographic Emulsions (Deystviye trietanolamina na fotograficheskiye emul'sii)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 118, Nr 4, pp. 744-746 (USSR)

ABSTRACT: The authors investigated the influence of triethanolamine on the photosensitivity of an emulsion on various illumination conditions and used the so obtained results for the explanation of the mechanism of the sensitizing effect of triethanolamine in analogy with the other types of sensitisation. Besides, the action of ionizing particles upon the same emulsions was investigated. The authors examined the behaviour of 7 different emulsions. The exposure was made by an impulse-like source (duration of the flash $1,2.10^{-6}$ sec) and by a low-voltage bulb (duration of exposure 5 to 45 seconds) through a neutral-grey stepped absorption wedge with the constant 0,17. The exposure with α- and β-rays was made by Po^{210} and by a

Card 1/3

β-radioactive sensitometer. Besides, an exposure with recoil-protons of a Ra-Be - neutron source was made. The development was performed under the usual conditions and the densities were measured by the photoelectric microphotometer MF - 2. A diagram illustrates the dependence of the sensitivity on the concentration of the triethanolamine for all the investigated emulsions. All emulsions become more sensitive the lower the photosensitivity of the original emulsion is; in the case of a few emulsions with low sensitivity this increase amounts to 1,5 orders of magnitude. The action of the triethanolamine always is somewhat stronger for the initial domain (i.e. for the bigger emulsion crystals). The optimum concentration for the sensitivity increase is 1-2 %. A further increase of the concentration does not increase the sensitivity, but the blurring. A bathing in triethanolamine does not give any increase of the sensitivity and therefore the action of triethanolamine is not connected with the process of development. The dependence of the sensitivity of one of these nuclear emulsions on the concentration of triethanolamine for the various sorts of radiation is illustrated in

5(4), 23(5) SOV/20-123-5-29/50

AUTHORS: Zhdanov, A. P., Kartuzhanskiy, A. L., Ryzhkova, I. V., Shur, L.I.

TITLE: The Conservability of a Latent Image and of Sensitivity in Nuclear Photoemulsions Sensitized by Triethanolamine (Sokhranyayemost' skrytogo izobrazheniya i chuvstvitel'nosti v yadernykh fotoemul'siyakh, sensibilizirovannykh trietanolaminom)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 5, pp 874-877 (USSR)

ABSTRACT: The treatment of nuclear photoemulsions with triethanolamine increases their sensitivity for any kind of particles (also for relativistic particles). Subcenters are formed in the reactions of triethylamine with AgHal in the emulsion crystals on the sensitivity centers. The conversion of these subcenters into centers of development proceeds with a markedly higher efficiency than the formation of such centers in the absence of subcenters. The present paper gives the corresponding experimental results together with the results of experiments which were carried out in order to explain

Card 1/4

The Conservability of a Latent Image and of Sensitivity in Nuclear Photoemulsions Sensitized by Triethanolamine

some details of the mechanism of the sensitizing of triethylamine. The experiments wer carried out at temperatures of 5°--6° on various specimens of the emulsion NIKFI type R which were irradiated by relativistic electrons. The first table gives data concerning the regression and the degree of conservation of 2 specimens of emulsions. An increase of triethanolamine in concentration does not cause an essential increase in density of the track. The track increases slightly ($\sim$10%) in density. The data of the first table make it possible to draw the following conclusion: The sensitivity and the latent image of emulsions sensitized by triethanolamine are totally conserved within the investigated time intervals and within the corresponding experimental errors. This property of triethanolamine is as essential as its sensitizing effect. The second table gives data which confirm the conclusion (Ref 4) that the sensitizing effect of triethanolamine is not due to its presence in the emulsion

The Conservability of a Latent Image and of Sensitivity in Nuclear Photoemulsions Sensitized by Triethanolamine

during the irradiation(and especially not due to the absorption of the halogen separated out by the radiolysis of AgHal). Beginning with the formation of subcenters, the presence of triethanolamine in the emulsion is not of essential importance and the subsequent variation of the properties of the emulsion is determined by the presence of subcenters in the crystals. The decrease of triethanolamine in alkalinity (by adding acids which do not react with AgHal) diminishes its sensitizing effect. The experiments discussed in the present paper prove the sensitizing and also the stabilizing effect of triethanolamine in complete agreement with the mechanism of its interaction with the crystals of the photoemulsion. There are 3 tables and 7 references, 5 of which are Soviet.

ASSOCIATION: Radiyevyy institut im. V. G. Khlopina Akademii nauk SSSR (Radium Institute imeni V. G. Khlopin of the Academy of Sciences, USSR)

SHUR, L.I., Cand Chem Sci -- (diss) "Manufacture of highly concentrated nuclear emulsions and their sensitizing with trietanolamine." Len, 1959, 10 pp (Acad Sci USSR. Radium Inst im V.G. Khlopin) 175 copies (KL, 34-59, 112)

KARTUZHANSKIY, A.L.; SHUR, L.I.

Effect of nonreciprocity at long lighting durations for nuclear photographic emulsions sensitized with triethanolamine. Zhur. nauch.i prikl.fot.i kin. 5 no.1:58-60 Ja-F '60. (MIRA 13:5)

1. Leningradskiy institut sovetskoy torgovli imeni F. Engel'sa.
(Photographic emulsions)
(Photography, Particle track)
(Ethanol)

S/077/60/005/003/009/009/XX
E073/E535

AUTHORS: Grigor'yev, O.P. and Shur, L.I.

TITLE: Drop Dosator for the Synthesis of Nuclear Emulsion[19]

PERIODICAL: Zhurnal nauchnoy i prikladnoy fotografii i kinematografii, 1960, Vol.5, No.3, pp.223-224

TEXT: The best method at present for producing small quantities of photographic emulsions with reproducible properties, and particularly with a given dimensional uniformity of the microcrystals. is by the two-solution method of Demers (Ref.1). Thereby, the greatest difficulty is encountered with designing special drop dosators for introducing gelatine into the reacting substances. An instrument is described which is very useful for manufacturing experimental nuclear emulsions (Fig.1). The basic part of the instrument is a working table 1 on a mobile bracket 2. Glass dosing devices 3 for the solutions of $AgNO_3$ and KBr are fixed, by means of clamps, to the table. The capillaries 4 of the dosators are connected to specially designed jets 5 by means of rubber hoses 6. The frequency of the droplets is controlled by changing the pressure exerted on the rubber hose by a strip 7 which is

Card 1/2

AUTHORS: Kartuzhanskiy, A. L., Shur, L. I.

S/020/60/131/01/017/060
B013/B007

TITLE: The Energy of the Activation of the Thermal Fading of a Latent Photographic Image

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 131, Nr 1, pp 64 - 67 (USSR)

ABSTRACT: The results given in the present paper also contain several data, which were determined by the method developed by P. V. Meyklyar. This method is based on the analysis of curves, which express the impossibility of substituting (of the so-called iso-opaque places) photographic layers within the range of long exposure times. The method in principle permits determination of the number of Ag atoms in the subcenter and the activation energy of an arbitrary group of atoms which is not larger than a subcenter. The authors first modify and supplement Meyklyar's method to a certain extent. The corresponding formulas are derived step by step and are explicitly written down. The experimental investigation was carried out on a fine-grained silver bromide emulsion, which had not been ripened a second time. The plates with the emulsion to be investigated were exposed for from 1 to 10^4 sec (sometimes also 10^5 sec) through a

Card 1/3

stepped wedge at temperatures of + 40, + 20°, and, in some cases also at 0°, after which they were developed in an Amidol developer according to the two-temperature dry process. The extreme inclination 1/2 (the Schwartzschild exponent p also equals 1/2 and the number n of atoms in the subcenter equals 2) was found only near the blackening threshold (blackening density $D < 0.1$). To the extreme inclination 2/3 ($p = 1/3$, $n = 3$) there corresponds $D \sim 0.6 - 0.8$, and with a sufficiently large D ($\sim 1.5 - 1.8$) the extreme inclination attains 3/4 ($p = 1/4$, $n = 4$). Figure 1 shows the iso-opaque places for the three aforementioned values of D. From table 1 the increase of the activation energy U_i with a decrease of the center consisting of i atoms may distinctly be seen. This increase is apparently slower than linear. The activation energy is approximately equal in all cases in which the Ag-particle lacks a total of one atom for stability. The stability of the center is thus due to the activation energy attaining a certain value, independent of the number of Ag-atoms required for this purpose. The efficacy of the sensitivity center must here be understood to be the depth of the corresponding "energy trap". The more

The Energy of the Activation of the Thermal Fading of a Latent Photographic Image

S/020/60/131/01/017/060
B013/B007

difficult the formation of the latent image, the more Ag-atoms are required for the purpose of obtaining an image of critical extent (which suffices for the subsequent catalysis of the image). There are 1 figure, 1 table, and 7 references, 6 of which are Soviet.

PRESENTED: September 12, 1959, by A. F. Ioffe, Academician

SUBMITTED: September 8, 1959

Card 3/3

KARTUZHANSKIY, A.L.; [illegible], L.I.

Sensitization of photographic emulsions with triethanolamine. Zhur.nauch.i prikl.fot. i kin. 6 no.4:306-316 Jl-Ag '61. (MIRA 14:11)

(Photographic emulsions)
(Triethanolamine)

BOGOMOLOV, K.S., red.; PERFILOV, N.A., red.; BELOVITSKIY, G.Ye., red.; DOBROSERDOVA, Ye.P., red.; ZHDANOV, G.B., red.; KARTUZHANSKIY, A.L., red.; LYUBOMILOV, S.I., red.; MINERVINA, Z.V., red.; RAZORENOVA, I.F., red.; ROMANOVSKAYA, K.M., red.; SAMOYLOVICH, D.M., red.; STARININ, K.V., red.; TRET'YAKOVA, M.I., red.; UVAROVA, V.M., red.; SHUR, L.I., red.; POPOVA, A.K., red.; VEPRIK, Ya.M., red.; VERES, L.F., red. izd-va; KUZNETSOVA, Ye.B., red. izd-va; POLYAKOVA, T.V., tekhn. red.

[Nuclear photography; transactions] IAdernaia fotografiia; trudy tret'ego Mezhdunarodnogo soveshchaniia. Moskva, Izd-vo Akad. nauk SSSR, 1962. 474 p. (MIRA 15:6)

1. Colloque International de Photographie Corpusculaire. 3d, Moscow, 1960. 2. Nauchno-issledovatel'skiy kinofotoinstitut, Moskva (for Bogomolov, Uvarova, Romanovskaya, Starinin). 3. Predsedatel' Organizatsionnogo komiteta Tret'yego Mezhdunarodnogo soveshchaniya po yadernoy fotografii. 1960, Moskva (for Bogomolov). 4. Zamestitel' predsedatelya Organizatsionnogo komiteta Tre'yego Mezhdunarodnogo soveshchaniya po yadernoy fotografii. 1960, Moskva (for Perfilov). 5. Radiyevyy institut im. V.G.Khlopina Akademii nauk, Leningrad (for Shur, Perfilov). 6. Institut sovetskoy torgovli im. F.Engel'sa (for Kartuzhanskiy). 7. Ob"yedinennyy institut yadernykh issledovaniy, Dubna (for Lyubomilov). 8. Institut atomnoy energii im. I.V.Kurchatova Akademii nauk SSSR, Moskva (for Samoylovich).

(Photography, Particle track)

ACCESSION NR: AP4026817 S/0077/64/009/002/0111/0114

AUTHORS: Zhdanov, A. P.; Shur, L. I.; Marty*sh, G. G.

TITLE: Increasing the discriminating capacity of nuclear emulsions by superproportional amplification

SOURCE: Zhurnal nauchnoy i prikladnoy fotografii i kinematografii, v. 9, no. 2, 1964, 111-114

TOPIC TAGS: discrimination capacity, nuclear emulsion, amplification, alpha radiation, recoil neutron, potassium bromide, exposure time

ABSTRACT: Superproportional mercury amplifiers, consisting of bleaching and blackening solutions, were used to study and discriminate ionization trails. The bleach solution contained 100 ml water, 5 g mercuric chloride, and 5 g potassium bromide. The darkening solution had sodium sulphide, hydroquinine, potassium bromide, and water. For optimum results both solutions were used in a 1:1 concentration ratio. Curves were obtained of blackening density as a function of exposure to α- and β-radiation. In all cases a superproportional increase in blackening density was noticed. To study the intensification effect on various ionization trails of particles, the plates were irradiated with α-particles from Po^{210} and protons recoiling from neutrons. A plot was also obtained for track width N versus

Card 1/3

ACCESSION NR: AP4026817

depth of layer on the surface (a) (see Fig. 1 on the Enclosure) and at the wall (b), 1- during intensification, 2- after intensification at 4C, and 3- after intensification at 20C. The largest width was obtained for the 20C intensification. Orig. art. has: 6 figures.

ASSOCIATION: none

SUBMITTED: 10Apr63 DATE ACQ: 16Apr64 ENCL: 01

SUB CODE: GC,GP NO REF SOV: 001 OTHER: 004

Card 2/3

ACCESSION NR: AP4026817 ENCLOSURE: 01

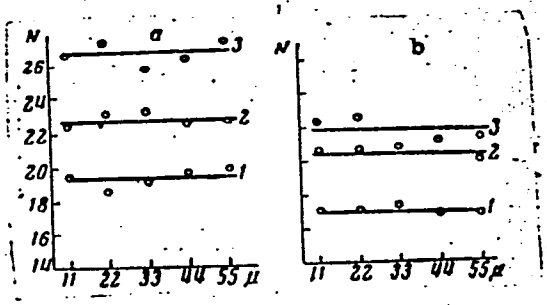

Fig. 1. Track width N versus depth of layer on the surface (a).

Card 3/3

L 63819-65

ACCESSION NR: AP5011723 UR/0077/64/009/004/0300/0302

AUTHOR: Zhdanov, A. P.; Kartuzhanskiy, A. L.; Martysh, G. G.; Shur, L. I. 18 B

TITLE: Effect of polyethylene glycol on nuclear photographic emulsions 20

SOURCE: Zhurnal nauchnoy i prikladnoy fotografii i kinematografii, v. 9, no. 4, 1964, 300-302

TOPIC TAGS: photographic chemistry, photographic chemical, nuclear emulsion, photosensitivity, glycol

ABSTRACT: Adding polyethylene glycol (PEG) to various photographic emulsions can substantially increase their light-sensitivity. The effect of PEG on various nuclear emulsions differing in characteristics, was tested both for exposure to light and to particles. It was added to emulsion in amounts from 0.8 to 3.2 grams per liter of emulsion. The experiments were performed on two relativistic emulsion s-- the R-NIKFI type and the extra fine grain PR-2, and two less sensitive emulsions, -- the Ya-2 and A-2 type. After glazing, the emulsion layers were exposed to low intensity light (exposure time = 45 seconds) through a graduated wedge, and also irradiated with Po^{210} alpha-particles, C^{14} beta-radiation in a special sensitometer, and by a beam of relativistic electrons. The results showed that the sensitivity to

Card 1/2

L 63819-65

ACCESSION NR: AP5011723

particles was not appreciably increased in any case. In contrast, the increment in light sensitivity in all cases was quite distinct. Another feature of the light-sensitivity results was that the increment in sensitivity bor no relationship to the original sensitivity and the extent of chemical sensitization of emulsions, but dropped off clearly with decreasing size of microcrystals. Therefore, the effect of PEG is related not to the reactions in which sensitivity centers participate, but with reactions in which the entire bulk or surface of the AgHal crystal participates.

ASSOCIATION: none

SUBMITTED: 18Mar64 ENCL: 00 SUB CODE: ES, GC

NO REF SOV: 006 OTHER: 000 JPRS

Card 2/2

BERKOVICH, I.B.; ZHDANOV, A.F.; MARTYSH, G.G.; SHUR, L.I.

Injection of radioactive nuclei into a photographic emulsion. Prib. i tekh. eksp. 9 no.6:63-64 N-D '64.

(MIRA 18:3)

VEPRIK, Ya.M.; GUSEVA, I.A.; ZHDANOV, A.P.; MARTYSH, G.G.; SHUR, L.I.

Nuclear emulsions developable in water-alkali solutions.
Zhur. nauch. i prikl. fot. i kin. 9 no.3:207-208 My-Je '64.
(MIRA 18:11)

1. Leningradskiy institut kinoinzhenerov i Radiyevyy institut imeni Khlopina, Leningrad. Submitted December 16, 1963.

SHUR, L. M.

SHUR, L. M.: "Feedback with respect to envelope in radio broadcasting equipment with amplitude modulation". Leningrad, 1955. Min Communications USSR. Leningrad Electrical Engineering Inst of Communications imeni Professor M. A. Bonch-Bruyevich. (Dissertations for the Degree of Candidate of Technical Sciences.)

So: Knizhnaya letopis' No. 49, 3 December 1955. Moscow.

USSR/Radiophysics - Radio-wave Propagation. Ionosphere, I-6

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35307

Author: Ryzhkov, Ye. V., Shur, L. M., Rakin, A. N.

Institution: None

Title: Automatic Panoramic Ionospheric Station

Original Periodical: Elektrosvyaz', 1956, No 5, 18-27

Abstract: Description of automatic panoramic ionospheric station for a wide band (0.5 - 20 Mc), developed and built by the Leningrad Electro-technical Communications Institute imeni Prof. M. A. Bonch-Bruyevich. Discussion of problems involved in the design of such stations. Technical data of the station, the basic characteristics of its units, and consideration in the choice of antenna installations are given.

Card 1/1

KHATSKELEVICH, V.A.; SHUR, L.M.

Envelope negative feedback in radio transmitting apparatus.
Elektrosviaz' 10 no.11:15-24 N '56. (MLRA 9:12)

(Radio--Transmitters and transmission)

SHUR, L. M.

CIRCUITS

"Construction of Envelope Feedback Loops in Radio Transmitting Apparatus," Vy V.A. Khatskelevich, L.M. Shur, Elektrosvyaz', No 7, July 1957, pp 26-33

Problems involved in the design of transmitter circuits with envelope feedback are considered, and the choice of the element of the feedback loop is analyzed. Some ideas are presented concerning a procedure for correcting the frequency characteristics of the loop so as to obtain effective envelope feedback. This work is a continuation of an article published by the authors in the November 1956 issue of Elektrosviaz'

Card 1/1

AUTHORS: Khatskelevich, V.A. and Shur, L.M. SOV/106-58-4-2/16

TITLE: Compensation of Non-linear Distortions by Envelope Feedback in Radio-transmitting Equipment (Kompensatsiya nelineynykh iskazheniy protivosvyaz'yu po ogibayushchey v radioperedayushchikh ustroystvakh)

PERIODICAL: Elektrosvyaz', 1958, Nr 4, pp 8 - 15 (USSR).

ABSTRACT: Non-linear distortions in transmitting equipment are approximately compensated by feedback only at low and medium modulating frequencies. The degree of this approximation depends on the shape of the modulation characteristic which determines the spectrum of the original distortions and the possibility of their compensation by feedback (Refs 1 and2). Compensation of non-linear distortions is worse at high modulating frequencies and the greater the unevenness of the amplitude-frequency characteristic in the modulation frequency band, the worse the compensation. Under unfavourable conditions, feedback can increase the distortions even with a uniform amplitude-frequency characteristic. The amplitude-frequency characteristic of equipment with feedback (Figure 1) is first considered in its general form.

1) Starting with the formula for the transfer coefficient of

Card 1/17

apparatus with feedback:

$$\dot{k}_n = \frac{\dot{k}}{1 - \dot{k}\dot{\beta}}$$

and assuming that the degree of feedback is large ($|k\beta|_p \gg 1$), the characteristic can be given as:

$$y = \left| \frac{k_n}{k_{np}} \right| \approx \left| \frac{k}{k_p} \right| \left| \frac{|k\beta|_p}{|1 - \dot{k}\dot{\beta}|} \right| , \qquad (1)$$

where the index p refers to values appertaining to the mid-frequency of the working band.
The loop frequency characteristic can be formed in circuit $\dot{k}$ or $\dot{\beta}$, or in both circuits simultaneously and the characteristic will depend on which circuit of the loop is used to form the "cut-off" (Refs 3, 6).
Thus, if the cut-off is formed by the $\dot{\beta}$-circuit only, then

Compensation of Non-linear Distortions by Envelope Feedback in Radio-transmitting Equipment

$$|k| = |k|_p = \text{const.}$$

and

$$y = \frac{|k\beta|_p}{v} \qquad (3)$$

where

$$v = \left\{1 + \left(\frac{|k\beta|_p}{z}\right)^2 + 2\,\frac{|k\beta|_p}{z}\cos\left[180^\circ(1-a)\right]\right\}^{1/2}$$

$$z = (x + \sqrt{x^2-1})^{2(1-a)}, \quad x = f/f_o,$$

f_o = the highest modulation frequency of the working band,

$a = \phi/180^\circ$ where ϕ is the phase stability margin.

Card 3/17

When the cut-off is formed in the k-section only, i.e. when the β-circuit is not frequency conscious, we have:

$$|\beta| = |\beta|_p = \text{const}, \quad |k| = \frac{|k|_p}{z}$$

and:

$$y = \frac{1}{z} \frac{|k\beta|_p}{v} \qquad (4)$$

The author also shows how the amplitude-frequency characteristic of the circuits k and β can be obtained to give any particular shape of the overall amplitude-frequency characteristics with feedback.

2) Frequency characteristics for the apparatus, calculated by Formulae (3) and (4) with $|k\beta|_p = 10$ and $a = 1/6$ ($\psi = 30^\circ$) are produced in Figure 2. From Figure 2, it is seen that a peak occurs at frequencies near to $2f_{cc}$, the value of which is much greater when the cut-off is formed by the

β-circuit (Curve 1) than when it is formed by the k-circuit (Curve 2). This fact is significant because in all practical cases, the modulating input voltage contains non-linear distortions. If, for example, the coefficient of the second harmonic of the input voltage at the highest working frequency comprises 1%, then when the cut-off is formed by the β-circuit, the corresponding voltage at the output becomes 20%, but when the cut-off is formed by the k-circuit, the corresponding output voltage is 2% only, the apparatus itself being considered perfectly linear in both cases.

It is obvious that, other conditions being equal, apparatus with the smallest peak in the amplitude-frequency characteristic beyond the limit of the working band, or with a falling characteristic in this region, is preferable. However, to reduce the distortions, it is not necessary to demand that the amplitude-frequency characteristic of the apparatus should not have a large peak or should be falling. This would introduce practical difficulties in its realisation. The problem is more easily solved by connecting in a filter Ø to limit the frequency band of the input voltage (Figure 1b). Because such

a filter is not included in the feedback loop, the attenuation which it introduces at frequencies $f > f_o$ can be made sufficiently great to compensate for any rise in the amplitude-frequency characteristic of the apparatus.
3) The author next examines the effect of amplitude characteristics of parts of the loop and of the entire apparatus with feedback beyond the limits of the working band on non-linear distortions arising in the k-circuit (Figure 1b). The k-circuit here consists of two sections; linear k_1 and non-linear k_2. Non-linear distortions, arising in k_2, can be replaced by a "distortion generator" e_u, connected to the input to this part of the loop. It is assumed that the level of the useful output voltage $u_{вых}$, the e.m.f. e_u of the distortion generator and the voltage $u_{вх}$ at the input to k_2 remain constant and for simplicity only one distortion component is considered. Then:

$$k_f = \frac{|k_2|\, e_u}{|k_2|_p u_{Bx}} = y_2 N \text{ and } k_{fn} = \frac{\frac{|k_2|}{|1 - \dot{k}_1 \dot{k}_2 \dot{\beta}|}\, e_u}{|k_2|_p u_{Bx}} =$$

$$= y_2 N \frac{1}{|1 - \dot{k}_1 \dot{k}_2 \dot{\beta}|} \qquad (7)$$

where $N = e_u / u_{Bx}$ is the coefficient giving the degree of non-linearity of the k_2 circuit; k_f and k_{fn} are coefficients of non-linear distortions at the output with and without feedback, respectively; $y_2 = |k_2| / |k_2|_p$ is the

Card 7/17

amplitude-frequency characteristic of the k_2 circuit. Thus, non-linear distortions at high frequencies depend on the frequency characteristic of the k_2 circuit in which they arise. Other conditions being equal, they will be less, the more sharply y_2 falls beyond the limits of the working frequency band.

Extra circuits with falling amplitude characteristics, connected after the apparatus, also reduce non-linear distortions at the output. In power modulators, a Π-type low-frequency filter, formed by shunting the primary winding of the modulation transformer with a capacitor, would be such a circuit.

Assuming that the loop transfer coefficient $\dot{k}\dot{\beta} = \dot{k}_1\dot{k}_2\dot{\beta}$ changes according to a step cut-/curve and using the previous denotations, from Eq.(7) we get:

$$k_{fn} = \frac{y_2^N}{v} \qquad (8)$$

Eq.(8) shows that k_{fn} does not depend on the amplitude-frequency characteristic of the k_1 and β-circuits. Therefore, distribution of correcting circuits between these parts of the loop will have no effect on the non-linear distortions.

4) To evaluate the feedback action, it is sufficient to compare non-linear distortions with feedback to distortions in the apparatus without feedback, other conditions remaining equal. The action of feedback on each component of the non-linear distortions can be obtained from Eq.(7) in the form:

$$D_m = \left(\frac{k_{fn}}{k_f}\right)_m = \frac{1}{\left|1 - \dot{k}\dot{\beta}\right|_m} \qquad (9)$$

where the index m denotes the number of the modulation frequency harmonic under consideration.

Eq.(9) remains true for all modulation frequencies. It shows that compensation of non-linear distortions by feedback

does not depend on the amplitude-frequency characteristics of the parts of the loop k_1, k_2, β and of the entire apparatus but is determined by the loop transfer coefficient only, $k_1 k_2 \beta = k\beta$.

Using the equation for a step dislocation, from Eq.(9) can be found the relationship of the degree of compensation of distortion D_m on the modulating frequency. Two cases are distinguished:

a) the frequency of the harmonic concerned mf equals or is less than f_c. In this case, $|k\beta| = |k|_p$ and with deep feedback, we obtain:

$$D_m \approx \frac{1}{|k\beta|_p} \qquad (10)$$

If the degree of feedback is small, then it is necessary to consider the change in the phase angle of the loop transfer coefficient with frequency. Within the limits of the

horizontal part of the amplitude-frequency characteristics of the loop this angle changes according to the law:

$$\varphi = -2(1-a) \arcsin \frac{f_i}{f_o}$$

where f_i is the frequency under consideration, f_o is the cut-off frequency.
Also, after determination of $\left|1 - \dot{k}\dot{\beta}\right|$, we obtain:

$$D_m = \frac{1}{\left\{1 + \left|k\beta\right|_p^2 + 2\left|k\beta\right|_p \cos\left[2(1-a) \arcsin mx\right]\right\}^{1/2}} \quad (11)$$

where $x = f/f_o$ and f is the modulation frequency for which the distortions are determined.
b) The examined frequency harmonic mf is greater than f_o.

Then:

$$|k\beta| = \frac{|k\beta|_p}{\left[\frac{mf}{f_o} + \sqrt{\left(\frac{mf}{f_o}\right)^2 - 1}\right]^{2(1-a)}}, \quad \arg(\bar{k\beta}) = -180^\circ(1-a)$$

and:

$$D_m = \frac{1}{\left\{1 + \left(\frac{|k\beta|_p}{z_m}\right)^2 + 2\frac{|k\beta|_p}{z_m}\cos[180^\circ(1-a)]\right\}^{1/2}} \qquad (12)$$

where:

$$z_m = \left[mx + \sqrt{(mx)^2 - 1}\right]^{2(1-a)} \quad \text{and} \quad x = f/f_o .$$

Card12/17

From Eq.(12), it is seen that values $D_m > 1$ are possible, i.e. feedback can produce an increase in the harmonics instead of compensating them.
Maximum D_m will be obtained at a modulation frequency determined by:

$$z_{m\ max} = \frac{|k\beta|_p}{-\cos\left[180^\circ(1-a)\right]} \qquad (13)$$

when:

$$D_{m\ max} = \frac{1}{\sin\left[180^\circ(1-a)\right]} \qquad (14)\ .$$

If the phase stability margin is taken $a = 1/6$ $(\psi = 30^\circ)$ then, from Eqs.(13) and (14), we find:

$D_{m\ max} = 2$, $z_{m\ max} = \frac{2}{\sqrt{3}}|k\beta|_p$ and $(mx)_{max} = \frac{z_{m\ max}^{3/5} + z_{m\ max}^{-3/5}}{2}$.

Compensation of Non-linear Distortions by Envelope Feedback in Radio-transmitting Equipment

With a smaller stability margin, increase of non-linear distortions will be more significant. Turning to Figure 3, where the curve of the step cutoff $|k\beta|$ is shown as a function of z, $|k\beta| = |k\beta|_p / z$, it is easy to believe that the point $z_{m\ max}$ is actually situated in the limits of the falling part of the dislocation characteristic, if the phase stability margin is taken as $a = 1/6$ and the amplitude stability margin $b \geq 1.2$ db $\left(|k\beta|_{zan} \leqslant \sqrt{3}/2 \right)$.

Thus, change of the loop transfer coefficient after frequency f_o in accordance with the curves of an ideal dislocation leads to increase of harmonics of the modulation frequency, falling in the region of frequencies close to $z_{m\ max}$. If these harmonics comprise a significant part of the distortions in the apparatus without feedback, then connection of feedback will lead to an increase of non-linear

distortions.
In Figure 4 are produced Curves $D_m = f(mx)$, calculated by Eqs.(11) and (12) with $a = 1/6$ and two values of feedback $|k\beta|_p$ = 20 db and 26 db. From the figure, it is seen that, in the first case, only those harmonics which fall in the region of frequencies $mx < 1.61$ are compensated and, in the second case, this region is extended to $mx < 2.30$. The necessary value of the margin can be found from Eq.(12) by giving a value to D_m at the frequency $f_{p\ max}$. So, if it is required that at frequency $f_{p\ max}$ the feedback neither increases nor compensates the distortions, i.e. $(D_m)_{f=f_{p\ max}} = 1$ then with $a = 1/6$, we obtain:

$$\frac{f_o}{f_{p\ max}} = \frac{2m}{\left(\frac{|k\beta|_p}{\sqrt{3}}\right)^{3/5} + \left(\frac{|k\beta|_p}{\sqrt{3}}\right)^{-3/5}} \qquad (15)$$

Compensation of Non-linear Distortions by Envelope Feedback in Radio-transmitting Equipment

Assuming that $(D_m)_{f=f_{p\ max}} = 0.5$, i.e. demanding that at the highest modulation frequency the feedback reduces the harmonic, producing the distortions, twofold then:

$$\frac{f_o}{f_{p\ max}} = \frac{2m}{\left(\frac{2|k\beta|_p}{\sqrt{3}+\sqrt{15}}\right)^{3/5} + \left(\frac{2|k\beta|_p}{\sqrt{3}+\sqrt{15}}\right)^{-3/5}} \qquad (16) .$$

Results of calculations by Formulae (15) and (16) for the two values of m and $|k\beta|_p$ are given in the table. The relationships produced and the data of the table allow the frequency band margin necessary to ensure effective action of feedback at all frequencies to be found approximately.

Card 16/17

Compensation of Non-linear Distortions by Envelope Feedback in Radio-transmitting Equipment

SOV/106-58-4-2/16

There are 4 figures, 1 table and 6 Soviet references.

SUBMITTED: June 8, 1957

Card 17/17 1. Radio transmitters--Distortion 2. Feedback amplifiers--Applications 3. Mathematics--Applications

1. KHAYN, A. F.; MESHCHERIN, N. A.; SHUR, L. N.

2. USSR (600)

4. Screw-Cutting Machines

7. Grinding thread milling cutters with a multiple grinding wheel. Sel'khozmashina No. 5, 1953.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

SOV/180-59-3-22/43

AUTHORS: Averkiyev, V.S., Luzhinskaya, M.G. and Shur, L.Ya. (Sverdlovsk)

TITLE: Improving the Properties of High Coercivity Alloys by Thermal-Mechanical Treatment

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 3, pp 125-127(USSR)

ABSTRACT: It is possible to control the magnetic properties of alloys to some extent by influencing their crystalline structure. Two of the present authors have previously described a new method of improving the properties of mechanically hard alloys by the application of tension during the process of heat treatment. This method, known as thermal-mechanical treatment, has been applied to several alloys and the greatest effect was obtained with Vikaloy consisting of 12% V, 52% Co and the remainder Fe. A detailed study of the influence of heat and mechanical treatment showed that the increase in coercive force that can be achieved by this treatment is mainly associated with increasing magnetic anisotropy of the alloy whilst the increase in the remanent induction is associated with strengthening of the

Card 1/3

Improving the Properties of High Coercivity Alloys by Thermal-Mechanical Treatment

magnetic texture. A study of the influence of the tensile loading was made and the results are plotted in Fig 1 for various loads applied during tempering of a specimen at temperatures of 580, 600 and 620°C for thirty minutes. At each tempering temperature there is an optimum value of load which gives the greatest increase in the coercive force and some increase in the remanent induction. Further increase in the load at the given temperature reduces the remanent induction and gives a smaller increase in the coercive force. The optimum conditions for Vikaloy are tempering at 600°C for thirty minutes with the application of the tensile stress of 30 kg/mm^2. The best conditions may, however, vary somewhat from one batch to another. The conditions of treatment must be maintained very constant if alloys of consistent properties are to be produced, temperature variations should not exceed $\pm$ 2°C. The rate of heating should be strictly constant and other conditions are also mentioned. In view of these requirements an installation was constructed for the application of mechanical and

Improving the Properties of High Coercivity Alloys by Thermal-Mechanical Treatment

thermal treatment, it is illustrated diagrammatically in Fig 1 and is briefly described. The magnetic material in the form of wire is maintained under tension and an electric furnace is gradually moved along. With this equipment material can be prepared in the form of wires in lengths up to three metres with uniform coercive force and remanent induction to within ± 2%. It has been found that heat and mechanical treatment improves other alloys besides that mentioned, including alloys with vanadium contents of 8 and 14% and also iron-manganese alloys containing 15% manganese. It is to be expected that similar treatment will influence the magnetic properties of other magnetically hard alloys in a similar way. There are 2 figures and 2 Soviet references.

ASSOCIATION: Institut fiziki metallov Ural'skogo filiala Akademii nauk SSSR (Institute of Metal Physics, Ural Branch, Academy of Sciences, USSR)

SUBMITTED: April 1, 1959

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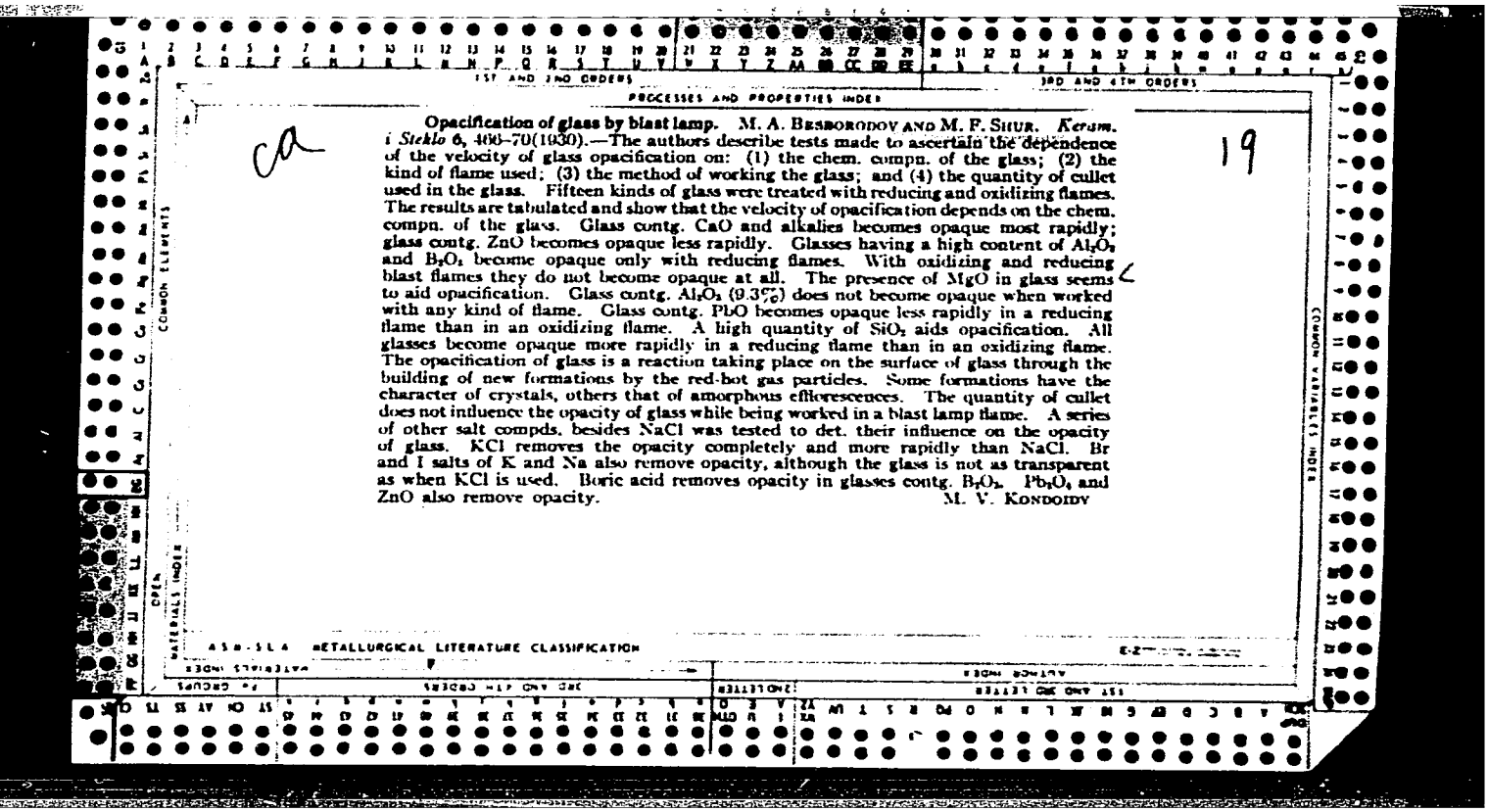
(Vnukovo--Airplanes--Maintenance and repair)



PROCESSES AND PROPERTIES INDEX

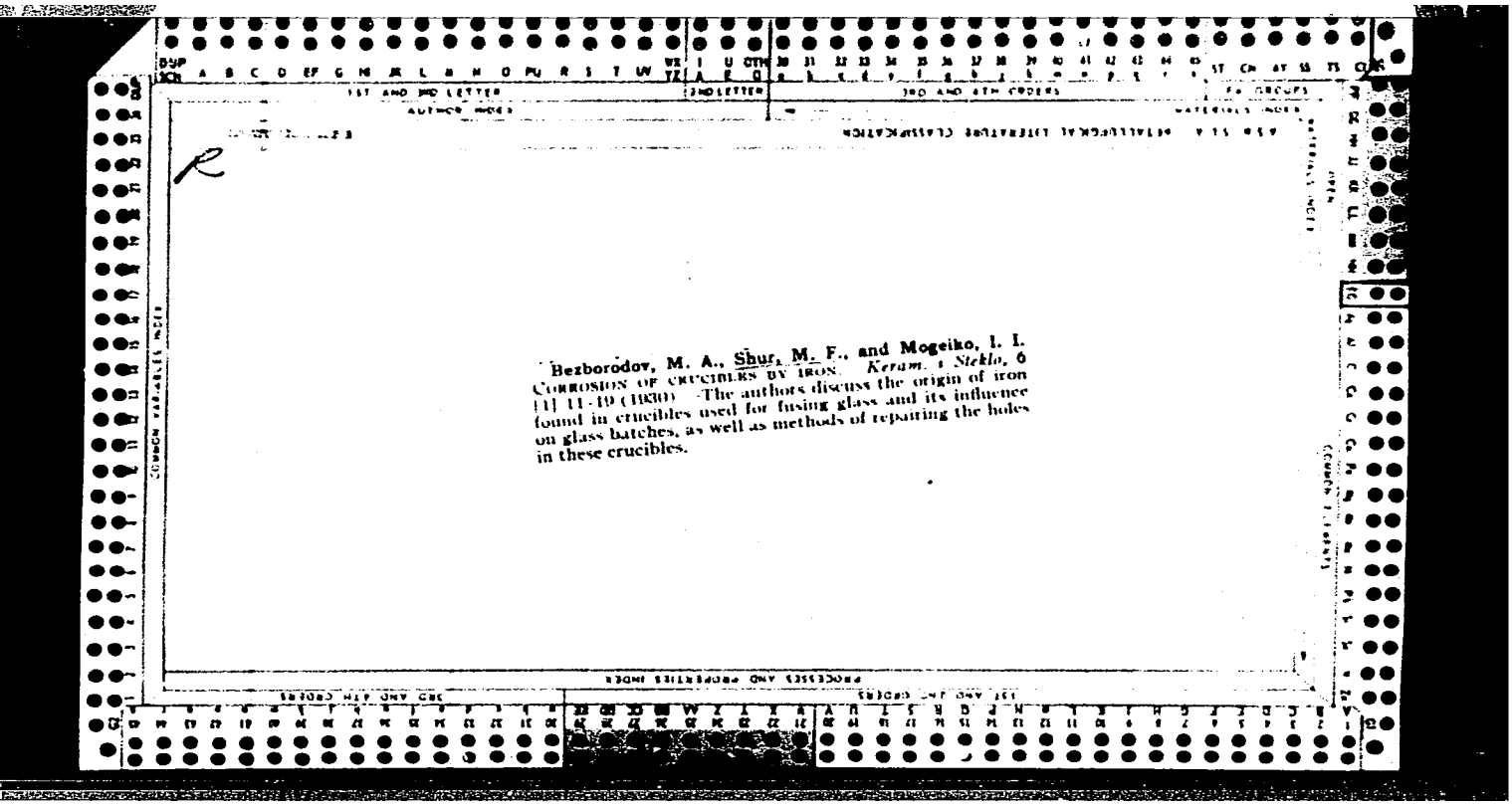
CA

19

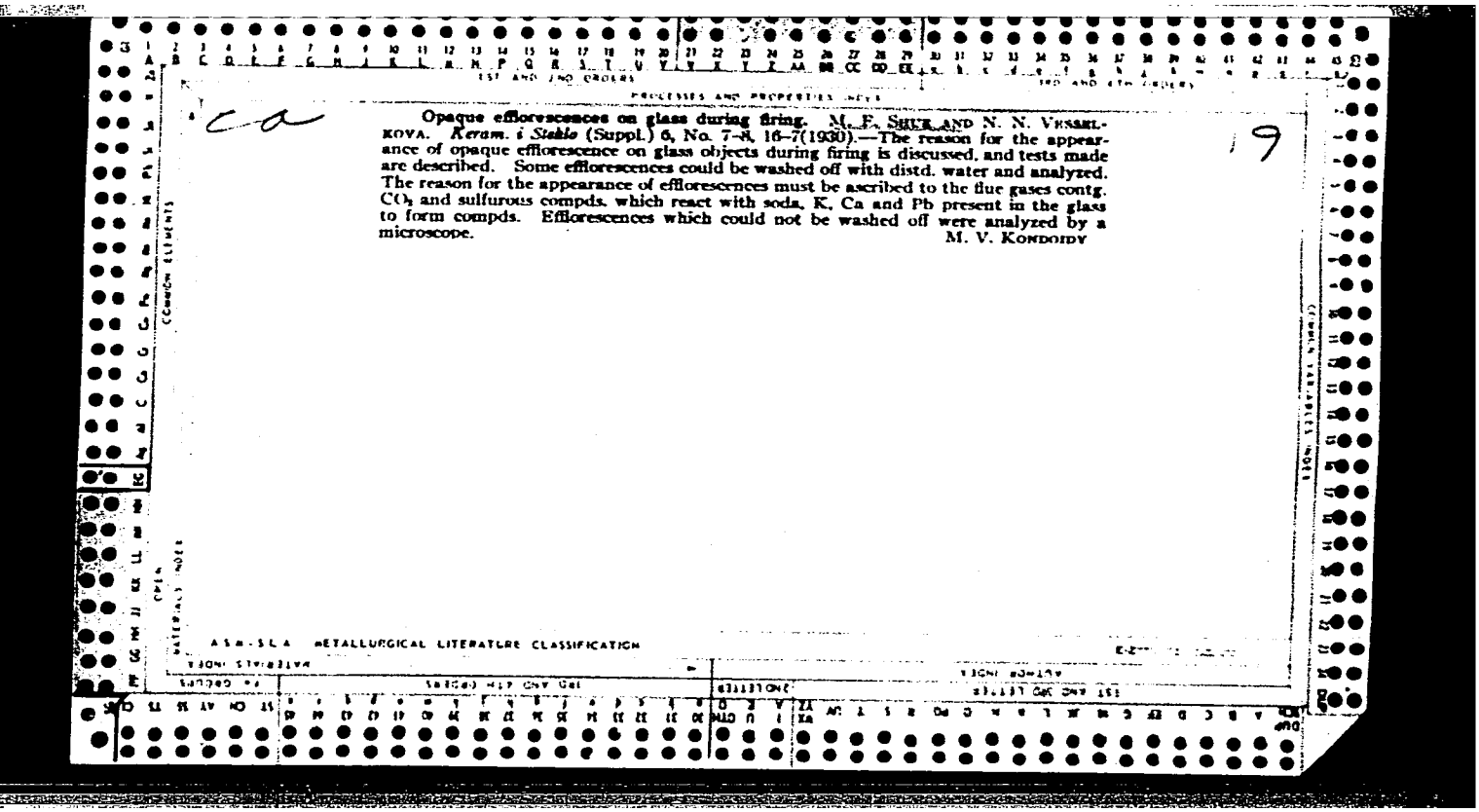
Opacification of glass by blast lamp. M. A. Bezborodov and M. F. Shur. *Keram. i Steklo* 6, 468–70(1930).—The authors describe tests made to ascertain the dependence of the velocity of glass opacification on: (1) the chem. compn. of the glass; (2) the kind of flame used; (3) the method of working the glass; and (4) the quantity of cullet used in the glass. Fifteen kinds of glass were treated with reducing and oxidizing flames. The results are tabulated and show that the velocity of opacification depends on the chem. compn. of the glass. Glass contg. CaO and alkalies becomes opaque most rapidly; glass contg. ZnO becomes opaque less rapidly. Glasses having a high content of Al_2O_3 and B_2O_3 become opaque only with reducing flames. With oxidizing and reducing blast flames they do not become opaque at all. The presence of MgO in glass seems to aid opacification. Glass contg. Al_2O_3 (9.3%) does not become opaque when worked with any kind of flame. Glass contg. PbO becomes opaque less rapidly in a reducing flame than in an oxidizing flame. A high quantity of SiO_2 aids opacification. All glasses become opaque more rapidly in a reducing flame than in an oxidizing flame. The opacification of glass is a reaction taking place on the surface of glass through the building of new formations by the red-hot gas particles. Some formations have the character of crystals, others that of amorphous efflorescences. The quantity of cullet does not influence the opacity of glass while being worked in a blast lamp flame. A series of other salt compds. besides NaCl was tested to det. their influence on the opacity of glass. KCl removes the opacity completely and more rapidly than NaCl. Br and I salts of K and Na also remove opacity, although the glass is not as transparent as when KCl is used. Boric acid removes opacity in glasses contg. B_2O_3. Pb_3O_4 and ZnO also remove opacity.

M. V. Kondoidy

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

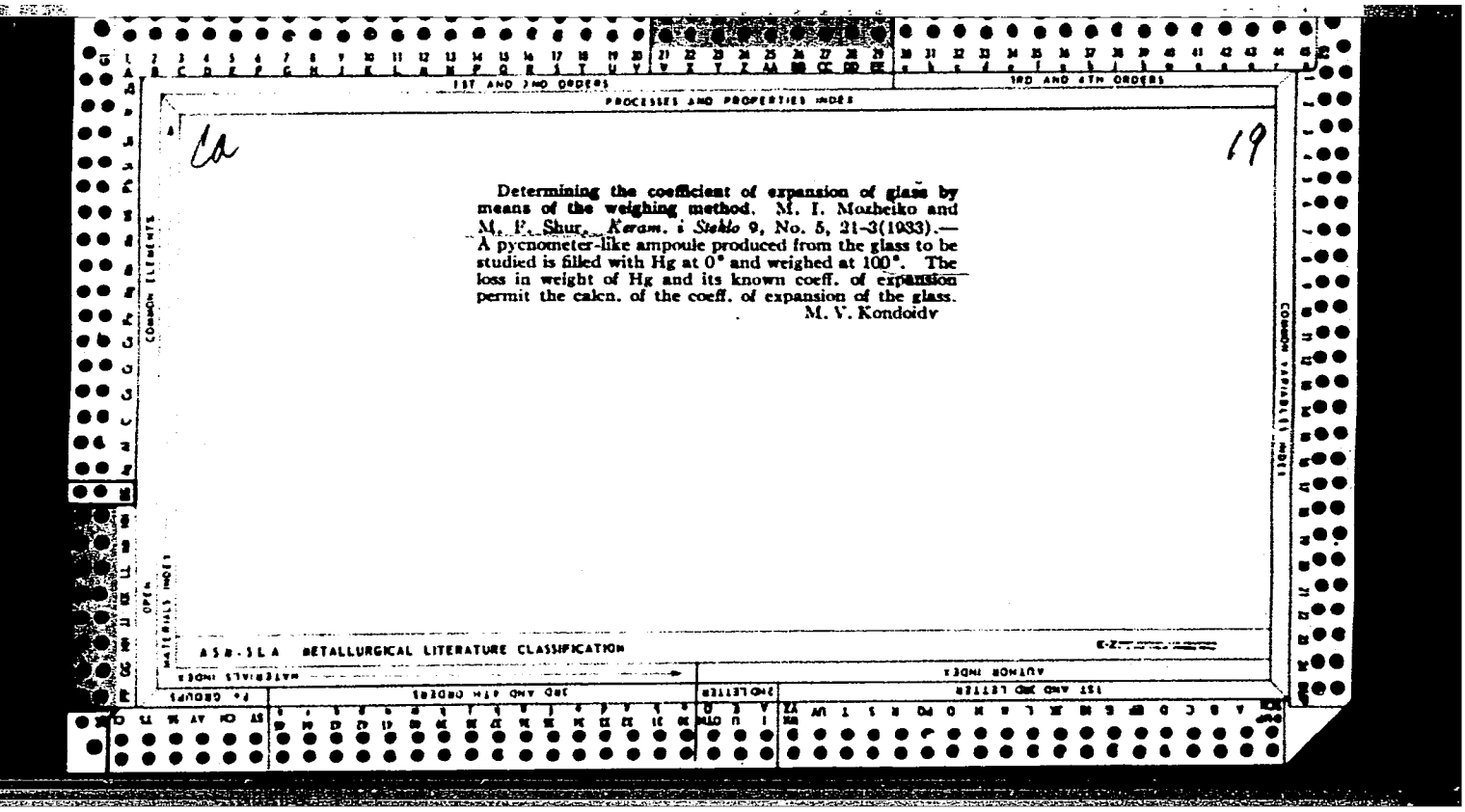


Bezborodov, M. A., Shur, M. F., and Mogeiko, I. I. CORROSION OF CRUCIBLES BY IRON. *Keram. i Steklo*, 6 [1] 11-19 (1960). The authors discuss the origin of iron found in crucibles used for fusing glass and its influence on glass batches, as well as methods of repairing the holes in these crucibles.



Opaque efflorescences on glass during firing. M. F. Shek and N. N. Vesnel-kova. *Keram. i Stekło* (Suppl.) 6, No. 7–8, 16–7(1930).—The reason for the appearance of opaque efflorescence on glass objects during firing is discussed, and tests made are described. Some efflorescences could be washed off with distd. water and analyzed. The reason for the appearance of efflorescences must be ascribed to the flue gases contg. CO_2 and sulfurous compds. which react with soda, K, Ca and Pb present in the glass to form compds. Efflorescences which could not be washed off were analyzed by a microscope.

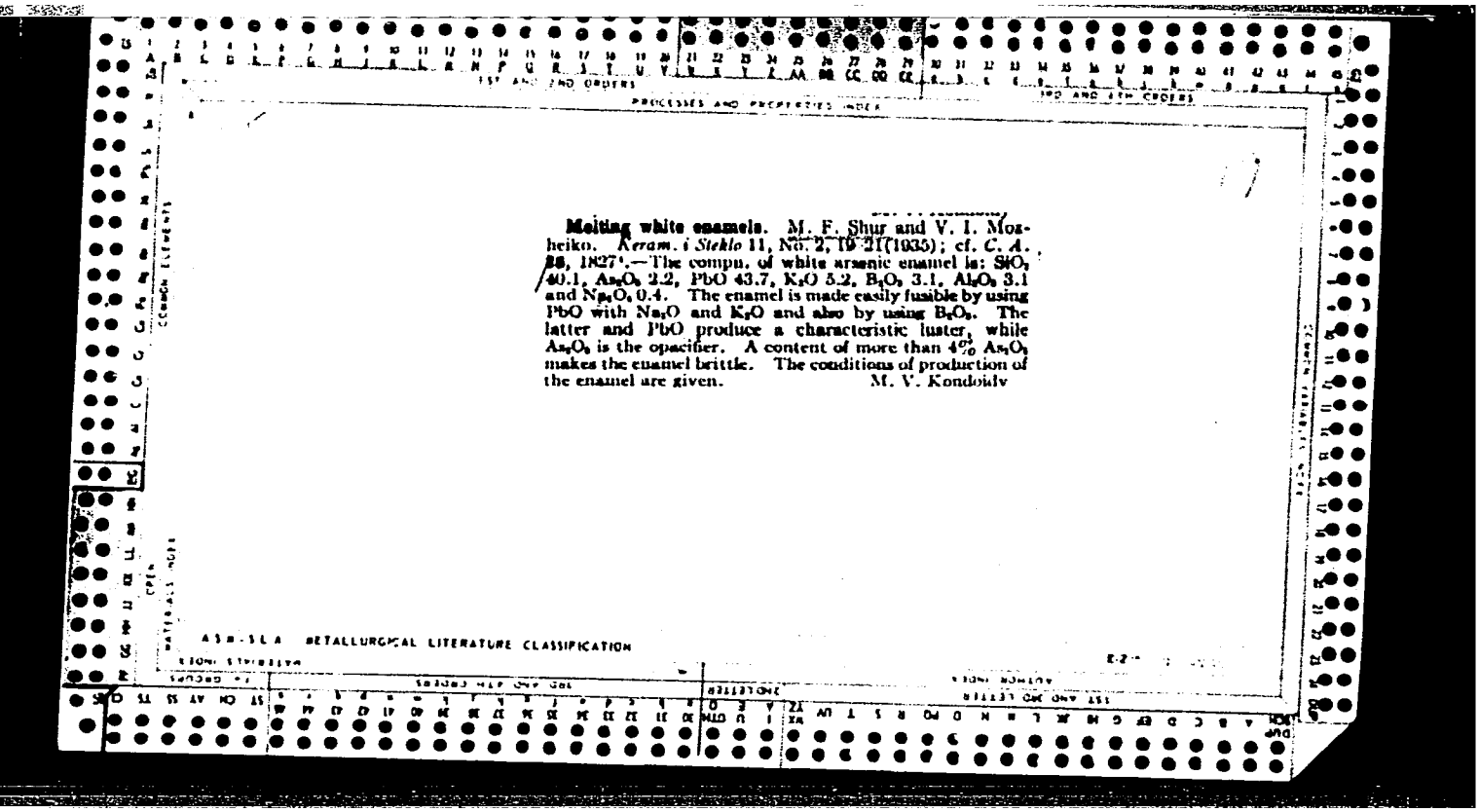
M. V. Kondoidy



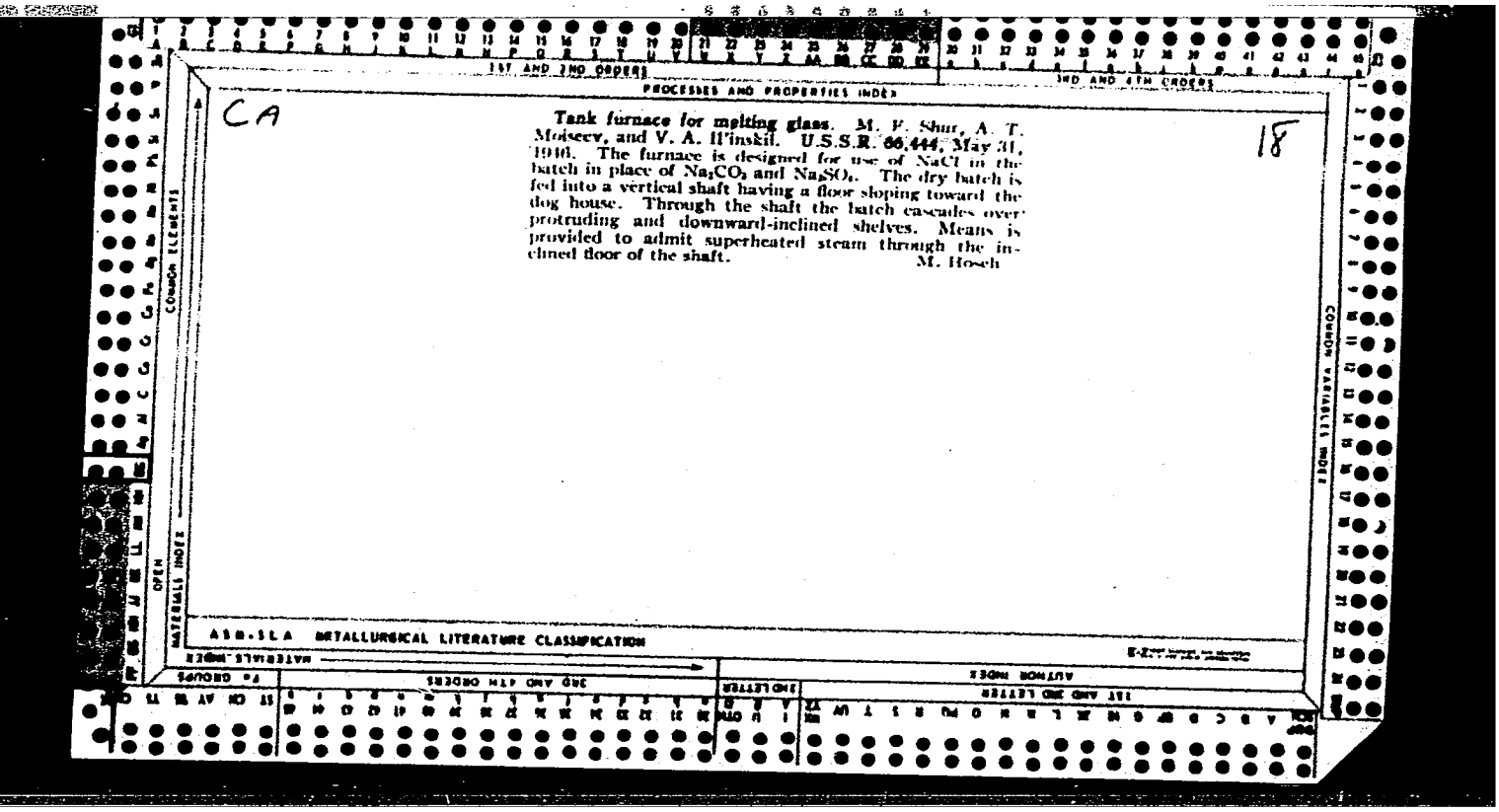
Ca 19

Determining the coefficient of expansion of glass by means of the weighing method. M. I. Mozheiko and M. F. Shur. *Keram. i Steklo* 9, No. 5, 21-3(1933).—A pycnometer-like ampoule produced from the glass to be studied is filled with Hg at 0° and weighed at 100°. The loss in weight of Hg and its known coeff. of expansion permit the calcn. of the coeff. of expansion of the glass.

M. V. Kondoidy



Melting white enamels. M. F. Shur and V. I. Mozheiko. *Keram. i Steklo* 11, No. 2, 19-21(1935); cf. *C. A.*, **28**, 1827⁷.—The compn. of white arsenic enamel is: SiO_2 40.1, As_2O_3 2.2, PbO 43.7, K_2O 5.2, B_2O_3 3.1, Al_2O_3 3.1 and Na_2O 0.4. The enamel is made easily fusible by using PbO with Na_2O and K_2O and also by using B_2O_3. The latter and PbO produce a characteristic luster, while As_2O_3 is the opacifier. A content of more than 4% As_2O_3 makes the enamel brittle. The conditions of production of the enamel are given. M. V. Kondoidy

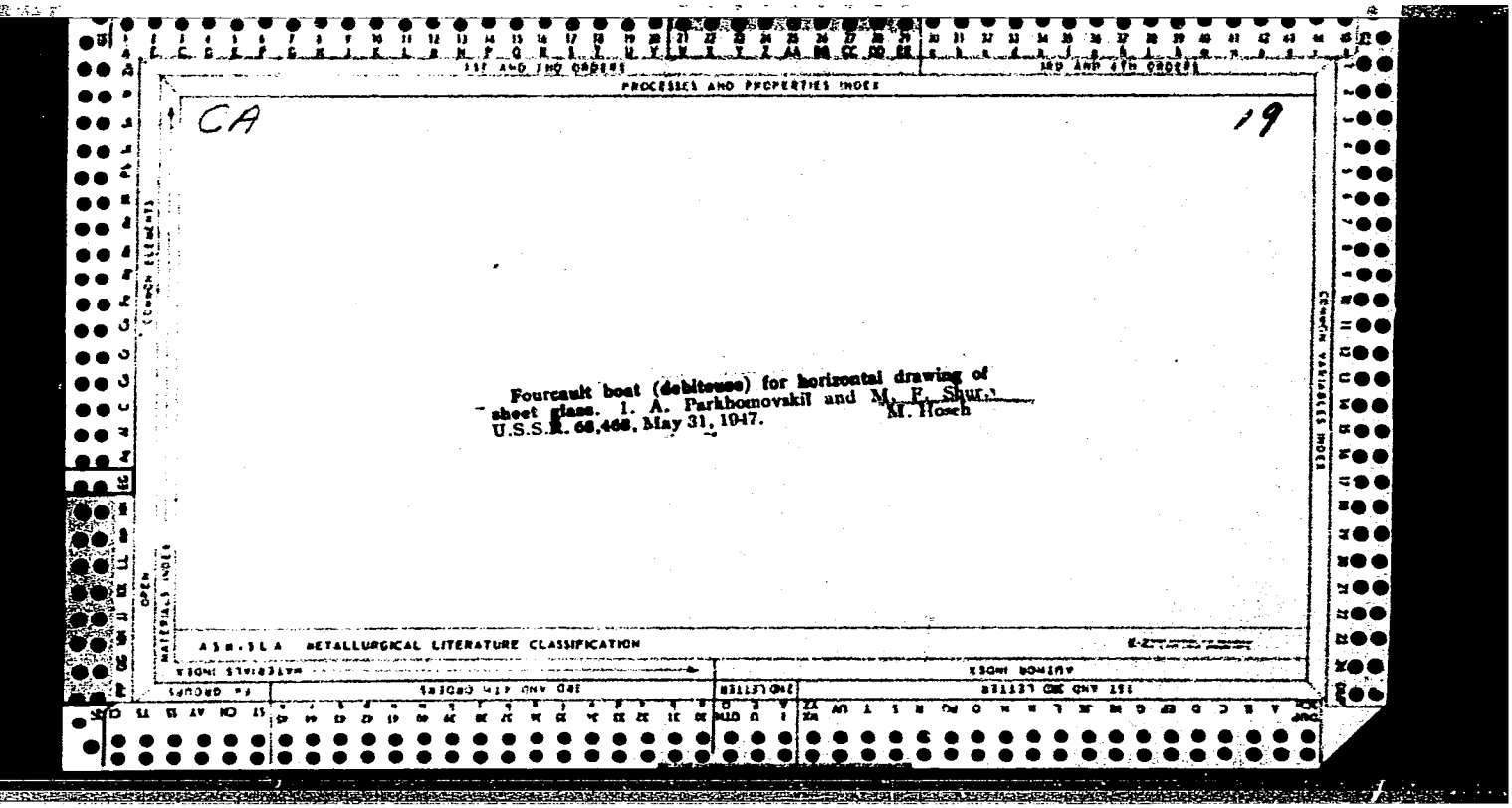


CA

18

Tank furnace for melting glass. M. F. Shur, A. T. Moiseev, and V. A. Il'inskii. U.S.S.R. 66,444, May 31, 1946. The furnace is designed for use of NaCl in the batch in place of Na_2CO_3 and Na_2SO_4. The dry batch is fed into a vertical shaft having a floor sloping toward the dog house. Through the shaft the batch cascades over protruding and downward-inclined shelves. Means is provided to admit superheated steam through the inclined floor of the shaft.

M. Hosch



BCS

Glass

1500. The work of the early 19th-century Russian technologist Shchebanin on increasing the thermal stability of glass.—M. A. Bezborodov and M. F. Shur (*Stek. Keram.*, 7, No. 10, 3, 1950). It is claimed that Russians had dealt with the thermal stability of glass in the thirties of the 19th c. Shchebanin annealed drinking glasses and changed their surface by a treatment with some unknown "mineral acids." It is claimed that the ware thus treated did not crack even if suddenly dipped into boiling water.

4-(5)-52

D. A. Kartsov—glass technologist. M. A. Bezborodov and M. F. Sitin. *Steklo i Keram.*, 8 [5] 3-7 (1951). The work of Kartsov during the 1830's is reviewed. B.Z.K.

BEZBORODOV, M.A.; SHUR, M.F.

First glass plant in Petersburg. Steklo i Keram. 9, No.1, 10-11 '52.
(CA 47 no.18:9071 '53) (MLRA 4:12)

[illegible]

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A. K. Krupskiy's work in the field of glass-making. Stek. i ker. 9, no. 4, 1952.

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SHUR, M. F.

"History of the Development of Glass Kilns in Russia."
Cand Tech Sci, Belorussian Polytechnic Inst, Minsk, 1954.
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SO: Sum. No. 631, 26 Aug 55-Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (14)

SHUR, M.F.

BEZBORODOV, M.A.; SHUR, M.F.

Russian glass works technology in the 18th century. Trudy po ist.tekh. no.10:3-22 '54. (MLRA 8:3)
(Glass manufacture—History)

AUTHOR: Shur, M. F. SOV/72-58-9-8/20

TITLE: Optical Glass in Russia 200 Years Ago (Opticheskoye steklo v Rossii pochti 200 let nazad)

PERIODICAL: Steklo i keramika, 1958, Nr 9, pp 19 - 19 (USSR)

ABSTRACT: In the edition of the newspaper "Sankt - Peterburgskiye vedomosti" dating from July 4, 1763 a notice is found, stating that Professor Tseyger at the session of the Academy of Sciences on July 2, 1763, gave a report on optical glasses produced in Russia. He showed that such glasses can be combined to so-called Doland-glass for telescopes. Such prisms were shown to the Empress Catherine II.(Yekaterina II) who attended this session. The scientific foundations for the production of such glass were worked out by the famous Russian scientist M.V.Lomonosov in the XVIII century. Nothing is known, however, about the future fate of this manufacturing establishment.

Card 1/2

SOV/52-3-2-2/10

AUTHOR: Shur, M. G.

TITLE: Ergodic Properties of Invariant Markov Chains on Homogeneous Spaces (Ergodicheskiye svoystva Markovskikh tsepey, invariantnykh na odnorodnykh prostranstvakh)

PERIODICAL: Teoriya veroyatnostey i yeye primeneniya, 1958, Vol. III, Nr 2, pp 137-152 (USSR)

ABSTRACT: It is possible to determine the Markov chains on a homogeneous, measurable space. The space can be denoted (X, G, $\mathfrak{B}$), i.e. consisting of any set of states (X), groups (G) and a system ($\mathfrak{B}$) of sub-sets. The set X can be affected by G while the system $\mathfrak{B}$ is invariant. In the case of a measurable space (X, $\mathfrak{B}$) the Markov chains will be homogeneous if the function P(x, E) can be derived for $x \in X$, $E \in \mathfrak{B}$, thus becoming a transition function of Markov chains. The following theorems can be proved for the chains on homogeneous space (X, G, $\mathfrak{B}$). 1. In order that the chain becomes strictly regular it is necessary that at least one set E of the space (X, G, $\mathfrak{B}$) be continuous, and that $(E, G_E, \mathfrak{B}_E)$ existed as an

Card 1/4

Ergodic Properties of Invariant Markov Chains on Homogeneous Spaces

invariant measure. 2. If a Markov chain is semi-regular and if there is at least one uniform set in X, then the chain is strictly regular on X. 3. If an invariant chain is strictly regular on X, then a set E_α belonging to it, becomes a sub-set of the space $(X, G, \mathfrak{B})$ and a set $E_{\alpha,i}$ becomes a sub-set of the space $(E_\alpha\ G_{E_\alpha}\ \mathfrak{B}_{E_\alpha})$. 4. If a Markov chain is invariant on the space $(X, G, \mathfrak{B})$ and strictly regular on X, then the limits (1) and (2) can be expressed as $E \in \mathfrak{B}$ at $x \in X$ = constant. An example of the homogeneous Markov chain can be shown as a bi-dimensional plane S on the Descartes system of co-ordinates with axes u and v. The set X can be presented by a combination of all the points (u, v) on the plane S with the co-ordinate u equal to any bi-rational number and the co-ordinate v equal to any natural number. A group of variations G of the set X can be determined if the variation $g \in G$, $g = g(a, n)$ is defined by two numerical parameters a and n, where a - bi - rational number $n = 0, \pm1, \pm2\ldots$ and if it is expressed as a transfer of every point $x = u, v$ from X into the point $x_1 = \left((u+a)/2^n, v + n\right)$. If $g_1 \in G$,

Card 2/4

Ergodic Properties of Invariant Markov Chains on Homogeneous Spaces

$g_1 = g(a_1, n_1)$ and $g_2 \in G$, $g_2 = g(a_2, n_2)$, then $g_1 g_2$ can be defined as equal to e and $a_2 = -2^{n_1} a_1$, , $n_2 = -n_1$. Therefore G becomes a transitive group of transformations of the set X. The set $\mathfrak{B}$ can be considered as a combination of all the sub-sets X in order to determine a homogeneous Markov chain on $(X, \mathfrak{B})$ by means of the equation:

$P(x, y_1) = P(x, y_2) = \frac{1}{2}$. From the expressions gy_1 and gy_2 it can be deduced that $P(gx, gy) = P(x, y)$ for all $x, y \in X$ and $g \in G$. If $E \in \mathfrak{B}$ is stochastically closed, then E together with any point $x = (u, v)$ contains

Ergodic Properties of Invariant Markov Chains on Homogeneous Spaces

the points x_1 and x_2 . The sets E_i represent a uniform stochastic space and $E_i \subset E$, or the set E can be divided. Therefore the invariant chains on (X, G, $\mathfrak{B}$) and on X have no undivided sub-set. There are no figures and 3 references; 2 of the references are Soviet and 1 is French.

SUBMITTED: January 24, 1958.

Card 4/4

16(1),16(2) 05794

AUTHORS: Karpelevich,F.I., Tutubalin,V.N., and Shur,M.G. SOV/52-4-4-5/13

TITLE: Limit Theorems for the Compositions of Distributions in the Lobachevskiy Plane and Space

PERIODICAL: Teoriya veroyatnostey i yeye primeneniya, 1959, Vol 4, Nr 4, pp 432-436 (USSR)

ABSTRACT: The authors investigate random variables in the Lobachevskiy space or plane L. The Borel measure $\mu(\Gamma)$ is called symmetrical if for every Borel set Γ and every rotation h around the coordinate origin 0 it holds: $\mu(h\Gamma) = \mu(\Gamma)$. The composition $\mu_1 * \mu_2(\Gamma)$ is defined by $\mu_1 * \mu_2(\Gamma) = \int_L \mu_1(\theta_x^{-1}\Gamma)\mu_2(dx)$, where θ_x is a motion in L which transforms 0 into the point x.

Theorem 1: Let $\varphi(\eta)$ be a bounded zonal spherical function (compare [Ref 2]). Then $\int\varphi(\eta)\mu_1 * \mu_2(dx) = \int\varphi(\eta)\mu_1(dx) \cdot \int\varphi(\eta)\mu_2(dx)$, where $\eta = \varrho(0,x)$ is the noneuclidean distance between 0 and x and μ_1, μ_2 are symmetrical measures.

Card 1/3

05794

Limit Theorems for the Compositions of Distributions in the Lobachevskiy Plane and Space SOV/52-4-4-5/13

Definition: the function $f(\varsigma) = \int \varphi(\varsigma,\eta)\hat{\mu}(d\eta)$ is called a characteristic function of first kind for the finite symmetrical measure μ. (Here $\hat{\mu}(A) = \mu\{x;\varsigma(0,x)\in A\}$).

Theorem 2: Let μ_n be a sequence of symmetrical measures, $\mu_n(L)\leq 1$; let its characteristic functions converge to $f(\varsigma)$. Then μ_n converges weakly to a measure μ the characteristic function of which is $f(\varsigma)$, where $\mu(L)\leq 1$.

Definition: $g(\varsigma) = \frac{f(\varsigma)}{f(0)}$ is called a characteristic function of second kind.

Theorem 3: If $g_n(\varsigma)$ converges to $g(\varsigma)$, if $\lim_{\eta\to\infty} h(\eta) = 0$ and if $\int_0^\infty h(\eta)\hat{\mu}_n(d\eta) \to \int_0^\infty h(\eta)\hat{\mu}(d\eta)$, then the measures μ_n converge weakly to μ.

Card 2/3

Limit Theorems for the Compositions of Distributions in the Lobachevskiy Plane and Space

05794
SOV/52-4-4-5/13

Definition: Let the dispersion of μ be

$$D(\mu) = -g''(\varsigma)\Big|_{\varsigma=0} = -\frac{f''(0)}{f(0)} .$$

It holds

$$D(\mu_1 * \mu_2) = D(\mu_1) + D(\mu_2) .$$

Theorem 4 treats the convergence of the sequence $\mu_{n,1} * \mu_{n,2} * \cdots * \mu_{n,k_n}$.

The authors mention M.Ye.Gertsenshteyn and V.B.Vasil'yev. There are 2 Soviet references.

SUBMITTED: December 25, 1958

~~16(1)~~ 16.6100 SOV/20-129-6-14/69

AUTHOR: Shur, M.G.

TITLE: On the Fellerean Property of Markov Processes

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 6, pp 1250-1253(USSR)

ABSTRACT: The author considers homogeneous Markov processes $X = (x_t, \zeta, M_t, P_x)$ with the space of the elementary events Ω given in measurable space $(E, \mathfrak{B})$. The author assumes that the σ-algebra $\mathfrak{B}$ is generated by a certain topology C of the space E, where the system (E,C) forms a locally bicompact Hausdorff space with denumerable base. He furthermore assumes that the processes are continuous from the right and that $P_x\{\zeta > 0\} = 1$ for all $x \in E$.

With every process X the author connects a semigroup of operators T_t which acts in the space L of the $\mathfrak{B}$-measurable bounded functions. Between the analytic properties of T_t and the probability theoretical properties of X there exist certain relations, the investigation of which is the object of the present paper.

Card 1/2

68151

On the Fellerean Property of Markov Processes SOV/20-129-6-14/69

In [Ref 6] I.V. Girsanov treats similar questions.
There are 6 references, 4 of which are Soviet, and 2 American.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova
(Moscow State University imeni M.V. Lomonosov)

PRESENTED: August 31, 1959, by P.S. Aleksandrov, Academician

SUBMITTED: August 10, 1959

Card 2/2

YAGLOM, Akiva Moiseyevich; YAGLOM, Isaak Moiseyevich; SHUR, M.G., red.; AKHLAMOV, S.N., tekhn.red.

[Probability and information] Veroiatnost' i informatsiia. Izd.2., perer. i dop. Moskva, Gos.izd-vo fiziko-matem.lit-ry, 1960. 315 p. (MIRA 13:5)
(Information theory) (Probabilities)

SHUR, M.G.

Harmonic and superharmonic functions connected with diffusion processes. Sib. mat. zhur. 1 no.2:277-296 Jl-Ag '60. (MIRA 13:12)

(Harmonic functions) (Diffusion)

SHUR, M.G.

Remark on the article "Harmonic and superharmonic functions connected with diffusion processes." Sib. mat. zhur. 2 no.4: 639-640 Jl-Ag '61. (MIRA 14:9)
(Harmonic functions)

21482
S/020/61/137/004/007/031
C111/C222

16.6100 (also 1031)

AUTHOR: Shur, M.G.

TITLE: Continuous additive functionals of Markov processes and excessive functions

PERIODICAL: Akademiya nauk SSSR. Doklady, vol.137, no.4, 1961, 800-803

TEXT: V.A.Volkonskiy's results (Ref.1: Tr.Mosk.matem.obshch., 9, 143 (1960)) on the one-to-one relation between a certain class of homogeneous additive functionals and a subclass of excessive functions are dontinued in developing. The author uses notations of Ye.B.Dynkin (Ref.2: Osnovaniya teorii markovskikh protsessov [Foundations of the theory of Markov processes], Moscow, 1959). Particularly let N_t be the σ-algebra generated by the events $\{x_s(\omega) \in \Gamma, \zeta > s\}$, where $s \leq t$, $\Gamma \in B$. The author considers the homogeneous Markov process $X = (x_t, \zeta, M_t, P_x, \theta_t)$ given in the measurable space (E,B). The function $\varphi_t(\omega)$ $(0 \leq t < \zeta(\omega))$ is called (cf.Ref.1) a homogeneous additive functional of the process X if 1) φ_t is $\overline{N}_t$-measurable; 2) $\varphi_s(\omega) + \theta_s \varphi_t(\omega) = \varphi_{s+t}(\omega)$ is P_x-almost sure on the set $s+t < \zeta(\omega)$ for all $s,t \geq 0, x \in E$;

Card 1/3

Continuous additive functionals...

3) $0 \leq \varphi_t(\omega) \leq \infty$ $(t \geq 0)$. The author assumes that $\varphi_t(\omega)$ is defined for all $t \geq 0$, and for $\infty \geq t \geq \zeta(\omega)$ he puts $\varphi_t(\omega) = \varphi_{\zeta(\omega)-0}(\omega)$. The function $f(x)$ is called a generalized potential of φ_t if $f(x) = M_x \varphi_\infty$. The generalized potential of a continuous one-dimensional additive functional $\varphi_t(\omega)$ is an excessive function.

Let the function $f(x)$ satisfy the condition (A) if for every $x \in E$ and every non-decreasing sequence τ_n of random variables independent of the future it holds $\lim_{n \to \infty} M_x f(x_{\tau_n}) = M_x f(x_\tau)$, where $\tau = \lim_{n \to \infty} \tau_n$.

Theorem 1: Let X be a standard process. In order that a bounded B-measurable excessive function $f(x)$ is the generalized potential of a certain continuous additive homogeneous functional $\varphi_t(\omega)$ it is necessary and sufficient the $f(x)$ satisfies the condition (A).
(A strong continuous from the right-hand homogeneous Markov process is a standard process a) if the σ-algebra B is a system of Borel sets of the locally bicompact Hausdorff space (E,C) with a countable base; b) if τ_n

Card 2/3

Continuous additive functionals...

is a non-decreasing sequence of random terms independent of the future, and $\tau = \lim_{n\to\infty} \tau_n$, then for every $x \in E$ on the set $\widetilde{\Omega} = \{\tau < \zeta\}$ it is P_x-almost sure: $x_{\tau_n} \to x_\tau$.) The proof of the theorem is based on an auxiliary theorem and a lemma.

There are 3 Soviet-bloc and 2 non-Soviet-bloc references. The references to the two English-language publications read as follows: E.B.Dynkin, Proc.of the Fourth Berkeley Symposium on Math.Statistics and Probability, 1960. G.A.Hunt, III. J.Math., 1, no.no.1, 3 (1957); 2, no.2 (1958).

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im.M.V.Lomonosova (Moscow State University im. M.V.Lomonosov)

PRESENTED: November 5, 1960, by P.S.Aleksandrov, Academician

SUBMITTED: November 1, 1960

Card 3/3

SHUR, M.G. (Moscow)

Localization of the concept of an excissive function linked with a Markov process. Teor. veroiat. i ee prim. 7 no.2:191-196 '62. (MIRA 15:5)

(Topology)
(Markov processes)

SHPARO, D.I.; SHUR, M.G.

Distribution of the roots of random polynomials. Vest.Mosk.un.-Ser.1: Mat.,mekh. 17 no.3:40-43 My-Je '62. (MIRA 15:7)

1. Kafedra teorii veroyatnostey Moskovskogo universiteta.
(Polynomials)

35723

S/020/62/143/002/006/022
B112/B108

16,6100

AUTHOR: Shur, M. G.

TITLE: Excessive functions and additive functionals of Markov processes

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 2, 1962, 293-296

TEXT: The author considers standard Markov processes $X = (x_t, \zeta, \mathcal{A}_t, P_x, \Lambda_t)$ which are defined in a measurable topological space $(E, \mathcal{E}, \mathcal{L})$. A measurable function $f(x)$ is said to be excessive if $f(x) \geq M_x f(x_t)$, $f(x) = \lim_{s \to 0} M_x f(x_s)$ for any $x \in E$ and $t \geq 0$. It is demonstrated that each excessive function $f(x)$ can be represented in the form $f(x) = f_1(x) + f_2(x) + f_3(x)$, where $f_1(x)$ is a regular harmonic function, $f_2(x)$ is a singular function, and $f_3(x)$ is the potential of a certain additive functional φ_t. There are 9 references: 6 Soviet and 3 non-Soviet. The English-language publication reads: G. A. Hunt, Illinois J. Math., 1, No. 1, No. 3 (1957); 2, No. 2 (1958).

Card 1/2

Excessive functions and additive...

S/020/62/143/002/006/022
B112/B108

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: October 23, 1961, by A. N. Kolmogorov, Academician

SUBMITTED: October 16, 1961

Card 2/2

S/020/62/144/002/004/028
B112/B102

AUTHOR: Shur, M. G.

TITLE: On Martin's bound for linear elliptic second-order operators

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 2, 1962, 290-292

TEXT: The author constructs a bound of the Martin type (cf. R. S. Martin, Trans. Am. Math. Soc., 49, no. 1 (1941)) for the linear elliptic operator

$$L = \sum_{i,j=1}^{m} a_{ij}(x)\partial^2/\partial x_i \partial x_j + \sum_{i=1}^{m} b_i(x)\partial/\partial x_i$$

which is given in a domain $D \subset R_m$. There is a Markov process $X = \{x_t, \tau, \mathcal{M}_t, P_x\}$ of which the infinitesimal operator $\mathcal{A}$ (in the sense of Ye. B. Dynkin) is equal to L on the set of all the functions that are twice differentiable in D. The process X is said to be reverting if there is a domain $U \subset D$ with a compact closure $\subset D$, so that the trajectory x_t arrives at the domain U within the time τ with an almost-probability

Card 1/2

P_x for any $x \in D$. The reverse of the process X is necessary and sufficient for the equation $Lu = 0$ to have at least one non-negative fundamental solution $v(x,y)$ in the domain D.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: January 2, 1962, by A. N. Kolmogorov, Academician

SUBMITTED: December 21, 1961

SHUR, M.G.

Martin's boundary for second-order linear elliptic operators.
Dokl.AN SSSR 144 no.2:290-292 My '62. (MIRA 15:5)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
Predstavleno akademikom A.N.Kolmogorovym.
(Operators (Mathematics))

42701

S/020/62/147/002/007/021
B112/B186

AUTHOR: Shur, M. G.

TITLE: A class of Markov processes whose exit probabilities are majorated by the exit probabilities of Wiener's process

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 2, 1962, 323-326

TEXT: In the 1-dimensional Euclidean space R^1, a Wiener process $\hat{X} = (\hat{x}_t, \hat{M}_t, \hat{P}_x)$ is considered together with an exact Markov process $X = (x_t, \zeta, M_t, P_x)$ which is obtained by a random substitution of time in a certain subprocess of the process $\hat{X}$. The instant of the first exit of X from the domain U is denoted by τ_U, and $\pi_U(x,\Gamma) = P_x\{x(\tau_U)\in\Gamma\}$, $\hat{\pi}_U(x,\Gamma) = \hat{P}_x\{\hat{x}(\hat{\tau}_U)\in\Gamma\}$ are defined for any Borel set $\Gamma\subset R^1$. The condition A: $\pi_U(x,\Gamma) \leqslant \hat{\pi}_U(x,\Gamma)$ is fulfilled for all Borel sets Γ. Furthermore, if $P_x\{\zeta>0\} = 1$ for all $x\in R^1$, then the following condition will be fulfilled: $\pi_{U_n}(x,R^1)\to 1$ for $n\to\infty$ if each of the domains

Card 1/2

U_n contains the point x and has a diameter tending to zero for $n \to \infty$. The result of this paper is the converse statement: For each standard process $X = (x_t, \zeta, M_t, P_x)$ which is given in the measurable space (R^1, B^1), where B^1 is the σ-algebra of the Borel sets in R^1, and which satisfies the conditions A and B, there exists an equivalent process X obtainable by a random substitution of time in a certain subprocess of a Wiener process.

PRESENTED: May 14, 1962, by P. S. Aleksandrov, Academician

SUBMITTED: May 11, 1962

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16.3600

S/038/63/027/001/002/004
B112/B186

AUTHOR: Shur, M. G.

TITLE: Martin boundary for the linear elliptic operator of the second order

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya matematicheskaya, v. 27, no. 1, 1963, 45-60

TEXT: The general linear elliptic second-order operator

$$L = \sum_1^m a_{ij}(x)\partial^2/\partial x_i \partial x_j + \sum_1^m b_i \partial/\partial x_i$$

is considered within a domain D, and is assumed to be non-degenerated there. It is shown that the equation $Lu = 0$, describing a certain diffusion process X, has a non-negative fundamental solution if and only if X is not reversible. For this case the Martin boundary is constructed.

SUBMITTED: June 7, 1961

Card 1/1

KHANT, Dzh.A.[Hunt, G.A.]; KIRILLOVA, L.S.[translator]; SHUR, M.G. [translator]; DYNKIN, Ye.B., red.; BRYANDINSKAYA, A.A., red.; RYBKINA, V.P., tekhn. red.

[Markoff [sic] processes and ptentials]Markovskie protsessy i potentsialy. Moskva, Izd-vo inostr. lit-ry, 1962. 276 p. Translated from the English. (MIRA 16:1)
(Markov processes) (Potential, Theory of)

SHUR, M.G.

A class of Markov processes whose exit probabilities are majorized by the exit probabilities of the Wiener process. Dokl. AN SSSR 147 no.2:323-326 N '62.
(MIRA 15:11)

1. Predstavleno akademikom P.S. Aleksandrovym.
(Markov processes) (Probabilities)

L 13318-63 EWT(d)/FCC(w)/BDS AFFTC IJP(C)

ACCESSION NR: AP3001463 S/0052/63/008/002/0224/0228

AUTHOR: Shur, M. G. (Moscow) 57

TITLE: The strong law of large numbers for Markov processes 16

SOURCE: Teoriya veroyatnostey i yeye primeneniya, v. 8, no. 2 , 1963, 224-228

TOPIC TAGS: strong law, Markov process

ABSTRACT: The main result of this paper is the derivation of the law of large numbers for Markov processes. Orig. art. has: 16 formulas.

ASSOCIATION: none

SUBMITTED: 14Dec61 DATE ACQ: 17Jun63 ENCL: 01

SUB CODE: 00 NO REF SOV: 005 OTHER: 006

Card 1/2

ACCESSION NR: AP4016036 S/0052/64/009/001/0125/0133

AUTHOR: Shur, M. G. (Moscow)

TITLE: Functions which are superharmonic for a Markov process

SOURCE: Teoriya veroyatnostey i yeye primeneniya, v. 9, no. 1, 1964, 125-133

TOPIC TAGS: superharmonic function, Markov process, Borel function, standard process, sigma algebra, semicompactum

ABSTRACT: In the semicompactum $(E, \mathfrak{G})$ consider the homogeneous, right continuous, standard Markov process $X = (x_t, \zeta, M_t, P_x)$. The almost Borel function $f(x)$ $(x \in E)$, which takes on numerical values possibly including $+\infty$, is called superharmonic for the process X if a) the function f is continuous in a natural topology related to the process X; b) for any $x \in E$ and any open set G with compact closure

$$M_x f(x(\tau_G)) \leqslant f(x),$$

Where τ_G is the moment of the first exist of the process X from G. Let S denote

Card 1/3

ACCESSION NR: AP4016036

the collection of delaying and absorbing points, i.e., the collection of points $x \in E$ for which almost certainly in P_x, $x(t,\omega) = x$ for all t from some random interval $0 \leq t < \delta$ of positive length. Let $\mathcal{U}$ be an arbitrary base for the topology $\mathcal{O}$, and $\mathcal{V}$ the collection of sets of the form U and $U \setminus S$ where $U \in \mathcal{U}$. Note that for a wide class of Markov processes either S is empty or $S = E$, and therefore for processes from this class $\mathcal{V}$ coincides with the base $\mathcal{U}$. The process X is assumed standard, and the function $f(x)$ $(x \in E)$ can take on any nonnegative values, possibly including $+\infty$. Theorem 1: Let the almost Borel function $f(x) \geq 0$ satisfy condition a) and (1) for any $x \in E$ and $G \in \mathcal{V}$. Then this function is superharmonic for X. Theorem 2: If the function $f(x) \geq 0$ is semicontinuous from below and satisfies (1) for any $x \in E$ and $G \in \mathcal{U}$, then it is superharmonic for X. Consider, in $(E,\mathcal{O})$, an arbitrary complete metric $r(x,y)$. Let $U(x,a)$ be the sphere $\{y: r(x,y) < a\}$, $a > 0$, and let $\mathfrak{F}_x$ be the collection of all sets V of the form $V = U(x,a)$ or $V = U(x,a) \setminus S$. Theorem 3: Let the almost Borel function $f(x) \geq 0$ satisfy a) and the condition

$$M_x f(x(\tau_V)) \leqslant f(x)$$

for any $x \in E$ and $V \in \mathfrak{F}_x$. Then $f(x)$ is superharmonic for X. Theorem 4: If the

Card 2/3

ACCESSION NR: AP4016036

function f(x) is semicontinuous from below and satisfies (2) for any $x \in E$, $a > 0$ and $V = U(x,a)$, then it is superharmonic for X. Orig. art. has: 16 formulas.

ASSOCIATION: none

SUBMITTED: 22Jun63 DATE ACQ: 19Mar64 ENCL: 00

SUB CODE: MM NO REF SOV: 003 OTHER: 002

Card 3/3

SHUR, M.G.

Additive functionals of Markov processes and excessive functions. Izv. AN SSSR. Ser. mat. 28 no. 1:123-146 Ja-F '64. (MIRA 17:6)

SHUR, M.G. (Moscow)

On the maximum in a Gaussian stationary process. Teor. veroiat. i ee prim. 10 no.2:386-389 '65. (MIRA 18:6)

L 00544-66 EWT(d) IJP(c)

ACCESSION NR: AP5021513 UR/0038/65/029/004/0783/0806
519.2

AUTHOR: Shur, M. G. 44,55

19
B

TITLE: Linear differential equations with randomly perturbed parameters 16,44,55

SOURCE: AN SSSR. Izvestiya. Seriya matematicheskaya, v. 29, no. 4, 1965, 783-806

TOPIC TAGS: differential equation, random process

ABSTRACT: The author treats

$$\frac{dy}{dt} = A(t)\,y + a(t) \qquad (1)$$

and

$$\frac{dy}{dt} = [A(t) + R(t)]\,y + a(t) + r(t), \qquad (2)$$

where a(t) is a nonrandom column vector with components $a_1(t),\ldots,a_m(t)$, A(t) = $(a_{ij}(t))$ is a nonrandom m x m matrix, and r(t), R(t) are a random column vector and random matrix respectively. The author studies the closeness of the solution of (1) to that of (2) as a function of the amount of randomness in r and R, using the usual statistical type measures of such closeness, as $t \to \infty$. He studies asymptotics of

Card 1/2

L 00544-66
ACCESSION NR: AP5021513

moments of solutions of (2) as $t \to \infty$ and shows that under certain conditions, if the norm of the solution of (1) grows not faster than $Ke^{\alpha t}$, then the norm of the solution of (2) grows not faster than $e^{\alpha_1 t}$. He shows that α_1 can be chosen arbitrarily close to α only if r_{ij} have zero means and sufficiently small range of values, if the r_{ij} process displays enough asymptotic independence. The given results can be strengthened if weak solutions rather than strong solutions are required. Orig. art. has: 62 formulas.

ASSOCIATION: none

SUBMITTED: 30May64 ENCL: 00 SUB CODE: MA

NO REF SOV: 006 OTHER: 006

Card 2/2